

possible to inhibit the deformation of the rim 5 of the gear 1, called a warpage, as shown in Fig. 3, thereby enhancing the tooth flank accuracy.--

IN THE CLAIMS:

Please add new claims 3 and 4 as follows:

—3. The gear of claim 2, wherein the groove is formed at substantially the center in the widthwise direction of the teeth.

4. The gear of claim 1, wherein the groove is provided at a plurality of locations along the outer surface of the teeth.—

REMARKS

Applicant has added new claims 3 and 4 and amended the specification. Applicant respectfully submits that these amendments to the claims and specification are supported by the application as originally filed and do not contain any new matter. Accordingly, the Office Action will be discussed in terms of the specification and claims as amended.

The Examiner has objected to the disclosure and pointed out certain informalities at pages 1, 2, 7 and 13. Applicant has amended the specification where indicated and respectfully requests that the Examiner withdraw his objection.

The Examiner has rejected claim 1 under 35 USC 103 as being obvious over Sakamaki in view of Sato et al., stating that Sakamaki discloses a gear made of a resin comprising a substantially cylindrical rim 5 having a plurality of teeth 3 formed around an outer periphery thereof, a boss 2 formed about a rotational center of said rim and a web 4 connecting the boss and the rim to each other, but does not disclose at least one groove along an outer surface of each tooth of the teeth; Sato et al. shows a gear 2 with at least one groove 10 defined along an outer surface of each tooth to divide the teeth in a widthwise direction; and it would have been obvious to one of ordinary skill in the art to modify Sakamaki in view of the teachings of Sato et al.

In reply thereto, Applicant has carefully reviewed Sakamaki and respectfully submits that while Sakamaki may disclose that which the Examiner states it does, it clearly does not show or suggest that one would provide a groove along the outer surface of each tooth of the teeth to divide the teeth in a widthwise direction of the teeth.

OK

Applicant has further reviewed Sato et al. and respectfully submits that Sato et al. describes forming a groove by way of cutting out a top surface of the teeth; however, Applicant respectfully submits that while Sato et al. merely teaches forming a groove by cutting out the top surface of the teeth, there is no description or suggestion in Sato et al. concerning cutting out the front and rear surfaces of each tooth. In addition, Applicant respectfully submits that Sato et al. does not show or suggest that the gear would be made from a resin or plastic.] *new claim*

In view of the above, therefore, Applicant respectfully submits that not only is the combination suggested by the Examiner not Applicant's invention but also the combination suggested by the Examiner is not suggested by the art. Therefore, Applicant respectfully submits claim 1 is not obvious over Sakamaki in view of Sato et al. Still further, Applicant respectfully submits that the particular construction claimed by new claims 3 and 4 are further not shown or suggested by the combination of Sakamaki and Sato et al. and new claims 3 and 4 are also not obvious thereover.


Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

In view of the above, therefore, it is respectfully requested that this Amendment be entered, favorably considered and the case passed to issue.

Please charge any additional costs incurred by or in order to implement this Amendment or required by any requests for extensions of time to KODA & ANDROLIA DEPOSIT ACCOUNT NO. 11-1445.

Respectfully submitted,

KODA & ANDROLIA

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William L. Androlia

Name

Signature

6/1/2003

Date

Application Serial No. 09/899,608

VERSION WITH MARKINGS TO SHOW CHANGES MADE
IN THE SPECIFICATION:

The last paragraph bridging pages 1 and 2 has been amended as follows:

al
A gear made of a resin is conventionally used in a power-transmitting mechanism for a duplicator, an automobile part and the like ~~for~~ for the purpose of reducing the part cost and the weight and the operational sound. The gear made of the resin is formed into a predetermined lightened shape by an injection molding, but the deformation such as a warpage and a sink may occur due to a difference between the amounts of material shrunk at molded portions. For example, as shown in Figs. 1 to 3, in a gear 1 formed of a resin so that a boss 3 and a rim 5 are connected to each other by a web 4, the amount of shrinkage or contraction of a connection 7 between the rim and the web 4 and the amount of shrinkage of an end of the rim 5 are different from each other and for this reason, there is a possibility that a sink (indicated by a broken line L1) is produced, i.e., the connection 7 between the rim 5 and the web 4 is deformed so that it is recessed. If such a sink is produced, the tooth flank accuracy is degraded. In a gear 1 formed of a resin with a web 4 offset toward one of ends of a rim 5, as shown in Fig. 3, the following disadvantage is encountered: A connection 7 between the web 4 extending radially outwards from an end of the boss 3 and the rim 5 is shrunk in a large amount and as a result, the free end of the rim 5a is deformed, namely, warped (indicated by a broken line L2) to look like being expanded. Particularly, in a gear having a large tooth width as in the prior art shown in Fig. 3, the above disadvantage is significant.

Page 2, first full paragraph, has been amended as follows:

al
In order to prevent the disadvantage associated with such gear 1, various gears made of a resin are conventionally proposed, which include ribs extending ~~radially~~ radially between a boss and a rim 5, or a an annular rib, and a web ~~5~~ 4 formed at a smaller thickness, while ensuring the strength, so that the deformation such as a warpage and a sink is inhibited by regulating the thickness at each of various portions, thereby enhancing the tooth flank accuracy (for example, see Japanese Patent Application Laid-open No. 9-230657 and the like).

The last paragraph bridging pages 6 and 7 has been amended as follows:

a3
In the gear 1 according to the present embodiment, however, groove 8 bisecting each tooth 6 in a widthwise direction is formed along outer peripheral surface of the tooth at substantially widthwise central portion of the tooth (at and in the vicinity of the connection 7 between the web 4 and the rim 5) corresponding to the portion particularly shrunk and deformed in the large amount in the conventional gear shown in Fig. 2. As a result, in the gear 1 according to the present embodiment, the substantially widthwise central portion is formed at a reduced thickness and hence, the amount of widthwise central portion ~~shrunk~~ shrink can be decreased, and the sink of the rim 5 can be reduced, thereby enhancing the accuracy of the tooth flank.

Page 13, first full paragraph, has been amended as follows:

a4
In the gear 1 made of the resin according to the above-described embodiment, the web 4 is formed at the substantially axially central portion of the boss 3. However, the present invention is not limited to this embodiment, and the web 4 may be formed at an axial end of the boss 3, and the boss 3 and the rim 5 may be connected to each other by the web 4. One groove 8 may be defined along the outer surface of each tooth 6 at substantially widthwise central portions of the teeth 5 of the gear 1 made of the resin. If the gear 1 is formed in the above manner, it is possible to inhibit the deformation of the rim 5 of the gear gear 1, called a warpage, as shown in Fig. 3, thereby enhancing the tooth flank accuracy.

IN THE CLAIMS:

Add new claims 3 and 4 as follows:

- a5
--3. The gear of claim 2, wherein the groove is formed at substantially the center in the widthwise direction of the teeth.
4. The gear of claim 1, wherein the groove is provided at a plurality of locations along the outer surface of the teeth.--